(OP 106) Engineering Cartilage Like Tissue Using Polymeric Systems Derived from 2-Ethyl-2-Pyrrolidone-Methacrylate Combined with Hyaluronic Acid

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Hydrogels are potential candidates for Tissue engineering (TE), because of their water content, transport properties, and tissue like physical and chemical behaviour. This project was based on the production and characterization of implantable stimuli responsive scaffolds made of hyaluronic acid (HA) that presents a high water retention character, in combination with 2-ethyl (2-pyrrolidone) methacrylate (EPM), possessing temperature-dependent solubility in water, by bulk polymerization.

Semi-interpenetrated networks were produced with different EPM and HA concentrations using K2S2O8 as an initiator and triethylene glycol dimethacrylate or N,N-methylene-bisacrylamide as crosslinkers. PEPM-HA hydrogels were washed and freeze dried. Characterization of the systems was assessed by NMR, ATR-FTIR and SEM techniques. The swelling degree and degradation behaviour studies were conducted in a phosphate buffer solution. Biocompatibility studies were performed by culturing bovine chondrocytes (BC), L929, ROS and MES in the PEPM-HA hydrogels. After evaluating the cells' viability, BC were cultured under agitation for a period of 6 weeks. Distribution, morphology and extracellular matrix components deposition during the experiment were analysed. The different combinations of EPM-HA and crosslinkers led to hydrogels with different porous structures that could be intimately related to their swelling character. When BC where incubated for 72 h in different PEPM-HA hydrogels, cells remained viable and therefore were cultured for a longer period of time to predict their suitability for a cartilage TE approach. PEPM-HA hydrogels may constitute a valid alternative for pursuing future cartilage tissue engineering strategies.